

Hungry birds! Are there any leftover discards?

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Discards generated from marine fisheries have significantly affected bird populations and communities through mechanisms such as competition, predator-prey interactions and nutrient transfer from the seafloor to the sky. Our understanding of the fate of discards beyond seabird scavenging is fragmented, but it is clear that the survival potential of fish species may influence commercial fish stocks, and that altered mechanisms between species populations and communities within and across ecosystem components in the water column and in the seafloor affect nutrient cycling, food webs and by large, the marine ecosystem structure and functioning. A keystone to understanding discards' fate beyond seabird scavenging lies in quantifying the amount and composition of discards that are consumed by seabirds.

The consumption of discards by scavenging seabirds was assessed for the French fishing fleet in the Bay of Biscay. Experimental sea trials were conducted to assess the proportion of discards consumed by foraging guild and discard type. Experimental discard consumption (EDC) was raised to fleet level by foraging guild using the total number of discards by discard type. The raising procedure accounted for the spatio-temporal variability of both foraging guilds and discards. To this end, we standardised both distributions to their lowest common resolution. Discards limited inferences in space, whilst the highest temporal resolution was determined by the biennial monitoring of foraging guilds. As EDC of roundfish by Large gulls and Gannets varied considerably, we investigated intra and inter guild competition as the main drivers of this variability. Roundfish consumption increased logarithmically with the number of ship followers for both Gannets and Large gulls. The logarithmic increase in consumption was however greatly impaired for Large gulls when other competing guilds were present in the flock of ship followers. Competition between Large gulls and Gannets reduced their roundfish consumption by threefold, while other guilds such as Kittiwakes, Procellariids and Skuas only had a limited, though significant, influence. As Large gulls dominated during the first semester (April to September), the consumption of discards and notably roundfish was dictated by this foraging guild. The abundance of ship following Gannets was remarkably higher in the second semester (October to March). This change in flock composition and in overall numbers of ship followers implied an increase in the consumed proportion of roundfish of 27.9%. The total number of discards that were not consumed was however higher in the first semester, as more discards were produced during this period. Most discards comprised benthic invertebrates, but excluding this discard type revealed that over two thirds of the discards were roundfish, despite of being scavenging seabirds' preferred food.

The quantification of seabird scavenging on discards in a spatio-temporal framework is a first and indispensable step in our understanding of the potential of discards to either surviving the fishing process and of the potential contribution of discards as food subsidies to marine scavengers in the water column or on the seafloor.